



INL's James Jones (second from left) led development of PITAS, which won the Christopher Columbus Fellowship Foundation's 2008 Homeland Security Award, a \$25,000 prize for technology that could solve a national security challenge.

## Nuclear materials detection technology wins national award

by Ethan Huffman, *INL Communications*

In the United States, tens of thousands of cargo containers – most the size of a railcar – enter the country every day through one of 93 maritime ports. Each container holds a surplus of products ranging from clothing to plasma televisions to medical equipment bound for places such as superstores and hospitals.

But since Sept. 11, 2001, concerns have been raised about how best to prevent dangerous materials or contraband items from being smuggled into the country alongside the millions of imported goods. In particular, homeland security and law enforcement professionals are most concerned about the potential for illicit radiological materials to make their way into the country through shipping ports.

The traditional counterproliferation approach has been to develop and implement a massive cargo screening program with the lofty goal of inspecting every cargo container being off-loaded on the dock. But this approach has been problematic, mainly due to the limited technical advances in screening technology and the time it takes to scan each container.

In addition, new concerns about the worldwide availability of nuclear materials and technology, combined with a rise in global terrorist operations, have likely increased the risk of a domestic nuclear attack. Nonproliferation experts claim a greater emphasis is needed on detecting nuclear materials before they enter or come near the 95,000-mile maritime border of the United States.

### INL's Solution

To address this growing challenge, scientists and engineers at the U.S. Department of Energy's Idaho National Laboratory have developed an award-winning prototype technology capable of accurately scanning cargo containers for smuggled and shielded nuclear materials at long distances.

The technology, developed by INL scientist Dr. James Jones and a team of INL and Idaho Accelerator Center engineers, is known as the Photonuclear Inspection and Threat Assessment System, or PITAS.

The system uses many of the same commercial components found in modern cancer treatment devices, including a linear accelerator that creates an invisible high-energy photon beam, which interrogates and identifies suspected nuclear materials. The beam works by inducing fission reactions in nuclear materials that create an assortment of prompt and delayed neutron and gamma rays. The delayed rays are analyzed by a series of detectors that looks for peaks and signatures consistent with illicit nuclear materials.

With PITAS in operation, security officials have the ability to scan cargo containers and detect dangerous nuclear materials while ships are still at sea.

And since the PITAS technology was designed to detect and alert operators to nuclear materials that have been covertly shielded, radiological dangers such as plutonium, uranium or thorium are distinguished during detection from simple medical or household items that often contain trace radioactive elements.

This added capability reduces common false positives and performs cargo scanning more efficiently. In addition, the technology was built to complete this entire process in several minutes and leave no residual environmental impact.

### Award-Winning Technology

This week, the Christopher Columbus Fellowship Foundation awarded its 2008 Homeland Security Award to recognize the PITAS technology for its numerous enhancements and advantages over current screening technology.



***INL's James Jones and the Photonuclear Inspection and Threat Assessment System, or PITAS.***

The Foundation and its co-sponsor, AgustaWestland North America, annually award one scientist a \$25,000 prize for development of technology that has the potential to solve a complex national security challenge.



***Idaho National Laboratory's Matt Kinlaw examines an array of gamma detectors on the PITAS technology.***

In announcing the recognition, Kimberly Owens, chair of the foundation, said, "Thousands of tons of cargo move through U.S. ports daily with little or no inspection. The Christopher Columbus Foundation and AgustaWestland are pleased to recognize Dr. Jones and his team for their work on the development of a nuclear materials detection system to facilitate the inspection of cargo containers for illicit nuclear material."

The Christopher Columbus Fellowship Foundation is an independent federal agency established by Congress in 1992 to encourage and support the development of technology that benefits mankind. The foundation's board and members of the award selection committee are presidential appointees. AgustaWestland North America, Inc. is one of the nation's largest manufacturers of law enforcement and military helicopters.

"As a lifelong scientist and inventor, I have been very fortunate to have worked on technology like the PITAS system that has the potential to save lives and combat terrorism," said Jones. "This is something that the Christopher Columbus Fellowship Foundation and AgustaWestland North America has recognized, and I am honored to accept this award."

In September, the PITAS technology was field tested in a realistic environment for its accuracy, range, and detection time. While the results are still being analyzed, one thing is certain, the PITAS technology represents a breakthrough homeland security solution.

The award's ceremony will take place the evening of Thursday, Sept. 11, in the U.S. Capitol Building.

[Read the PITAS fact sheet here.](#)

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